

REMARKS

The claims have been amended to better define the claimed invention and better distinguish the claimed invention from the prior art. More particularly, the claims have been amended to clarify that the circuit patterns, the etch resist masks and the plating resist masks all are direct imagewise printed. None of the art teaches or suggests the combination of steps required by Applicant's claims. Claims 31 and 40 also have been amended to address the 112 rejection.

Before considering the specific art rejections, a brief review of the general state of the art may be helpful.

The present invention employs printing techniques to directly form circuit patterns, circuit devices, and masks by direct imagewise printing techniques. This provides Applicant with significant advantages over the prior art in terms of accuracy, cost savings and reduced waste chemicals as compared to conventional wet chemistry subtractive techniques generally employed by the circuit board industry.

Turning to the specific art rejections, and considering first the rejection of claims 1-3 as anticipated by Godek, Godek teaches conventional wet chemistry attractive techniques and selective etching. For forming conductive patterns (Col. 4, lines 17 - 21). Godek et al. does mention forming the conductive circuits by thick-film technology using screen-printing. Screen printing is not direct imagewise printing and is not as accurate as direct imagewise printing.

Thus, claim 1 and the several claims dependent thereon cannot be said to be anticipated by Godek et al.

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Turning to the rejection of claims 12 and 25 as anticipated by Ammon et al., Ammon et al. teaches making multilayered boards by utilizing two sided plated through boards made by classic industry methods. The two sided boards are stacked with a dielectric between and driving a conductive metal pin through the stack. The conductive pin eliminates the need for plating through the holes in the multi-layer structure. The only new (different from standard PCB industry practice) item is the pressed in pin. There is no teaching or suggestion in Ammon et al. of direct imagewise printing circuit patterns, etc. on substrates as required by claims 12 and 25. Thus, neither claim 12, nor 25, nor any of the claims dependent thereon can be said to be obvious from Ammon et al.

The rejection of claims 31 and 39 as anticipated by Murakami et al. likewise is in error. Independent claim 31 and 39 which depends thereon require direct imagewise printing a pattern mask. Murakami et al. doesn't teach this. Murakami et al. roughens up the conductor surface then places a photo resist layer containing sublimely copper corrosion inhibitor then he describes generally the industry method as he continues except that heat treatment is given the photo polymer resist to prevent lift off. Thus, neither claim 1 nor claim 39 nor any claim dependent thereon can be said to be anticipated by or for that matter obvious from Murakami et al.

Turning to the rejection of claims 4-11 as obvious from Godek in view of Piatt and Seibel, the claims 4-11 depend directly or indirectly on claim 1. The deficiencies of Godek vis-à-vis claim 1 are discussed above. It is not seen that Piatt alone or in combination with Seibel supplies the missing teachings to Godek to achieve or render obvious claim 1 or any of the claim dependent thereon. Piatt teaches printing an image on a flexible metal substrate etching the substrate and then adhering the substrate to a more rigid substrate to form a circuit board.

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Applicant's dependent claim 1 requires direct imagewise printing of a conductive composition onto a non-conducting substrate. Seibel is cited as teaching a semi-additive method of forming a circuit pattern. Albeit as it may, the more basic and essential teachings missing from the primary reference are not supplied by Seibel. Thus, no combination of Godek, Piatt and Seibel reasonably can be said to achieve or render obvious claim 1 or claims 4-11, which depend thereon.

Turning to the rejection of claims 13 and 14 as obvious from Ammon in view of Roth, claims 13 and 14 are directly or indirectly dependent on claim 12. The deficiencies of Ammon vis-à-vis claim 12 are discussed above. Roth does not supply the missing teachings. Roth has been cited with a teaching that resistors may be printed on a circuit board using direct thermal printing. However, the more basic and essential features missing from Ammon vis-à-vis claim 12 are not supplied by Roth. Thus, no combination of Ammon and Roth could achieve claim 12 or claim 13 and 14 which depend thereon.

Turning to the rejection of claims 15-24 and 26-30 as obvious from Ammon in view of Piatt and Seibel, claims 15-24 and 26-30 are directly or indirectly dependent on claim 12. The deficiencies of Ammon vis-à-vis claim 12 are discussed above. Also discussed above are the deficiencies of Piatt and Seibel. Thus, no combination of Ammon, Piatt and Seibel could achieve or render obvious claim 12 or any of the claims dependent thereon.

Finally, and with reference to the rejection of claims 32-38 as obvious from Murakami in view of Piatt, claims 32-38 are directly or indirectly dependent on claim 31. The deficiencies of the primary reference Murakami vis-à-vis claim 31 are discussed above. Piatt does not supply the missing teachings. Moreover, the Examiner's suggestion of official notice of the use of

fusible ink masks as being old and well known in the art of forming circuit boards is challenged. Accordingly, no combination of Murakami and Piatt could achieve or render obvious claim 31 or claims 32-38, which depend thereon.

A Supplemental IDS accompanies this Amendment.

Having dealt with all the objections raised by the Examiner, the Application is believed to be in order for allowance. Early and favorable action are respectfully requested.

In the event there are any fee deficiencies or additional fees are payable, please charge them (or credit any overpayment) to our Deposit Account Number 08-1391.

Respectfully submitted,



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I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on December 15, 2003, at Tucson, Arizona.

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